



Urban Community Heating and Cooling:  
the Southampton District Energy Scheme

# Overview: Southampton District Energy Scheme



Southampton City Council (SCC) is committed to the sustainable development of the City. The Southampton District Energy Scheme (SDES) is a key element in its strategy for achieving this.

SDES is based on a successful public-private partnership delivering competitively priced energy services to businesses, householders and public buildings, also assisting regeneration of the city. In addition, the scheme helps the reduction of fuel poverty and delivers a number of social benefits.

SCC has developed the scheme in partnership with Utilicom, a private company. Utilicom set up a special purpose company for delivering the scheme, called the Southampton Geothermal Heating Company (SGHC) Ltd. SCC assists by actively encouraging new and existing buildings to connect to the scheme.

The term 'district energy' embraces both district heating and district cooling. In the UK, district heating is more commonly known as community heating.

Community heating integrated with combined heat and power is a key element of the government's strategy for reducing CO<sub>2</sub> emissions and for tackling fuel poverty.

SDES uses energy efficient CHP plant and geothermal energy currently saving 11,000 tonnes of carbon emissions each year and reducing costs for its customers. The scheme also provides a route for the future adoption of renewable energy on a city-wide scale.

The success of SDES is demonstrated by its continuing growth from serving one customer in the mid 1980s to more than 40 commercial and public sector customers and hundreds of households by 2003. It now produces over 70GWh of energy a year, providing low cost heating, hot water and in some instances, cooling to a variety of customers including private and social housing, hotels, offices, council administration buildings, a hospital, retail developments and a leisure complex.

In 2001 SGHC Ltd. won the prestigious Queen's Award for Enterprise in the Sustainable Development Category. In 1999 the scheme won the Combined Heat & Power Association Community Heating Award.

This case study describes how SDES has enabled SCC to implement sustainability in the context of a public private partnership with Utilicom. It demonstrates that community heating can be an environmentally friendly, cost-effective, flexible and reliable way of providing heating, hot water and cooling to a wide variety of urban consumers.

The case study is intended for use by people decision-makers involved in the supply of energy services in urban developments. These include: local authorities, developers, town planners and urban architects, building services consultants and housing associations.



The Queen's Award for Enterprise: "The Award for Sustainable Development recognises and encourages the outstanding performance of commercially successful products, services and approaches to management which have major benefits for the environment, society and wider economy."

# How community heating contributes to sustainable development

## What is community heating?

Community heating involves the use of a central boiler plant (or other heat sources) to heat a number of buildings or dwellings. Community heating schemes come in all shapes and sizes, from single blocks of flats to schemes serving city neighbourhoods connecting many different consumers via a network of well insulated underground pipes.

## Fuel flexibility

By using central boiler plant, community heating schemes can benefit from competitive fuel purchasing and energy-efficient sources such as combined heat and power. The heat network, once established, can also be used to introduce almost any source of heat, including industrial waste heat, municipal waste and renewable energy.

## Combined heat and power

Combined heat and power (CHP) is the production of electricity and useful heat from a single plant.

In a conventional power station, only a small part of the input energy is converted to electricity (typically 30-50%). The rest is wasted heat that is lost to the surroundings. With CHP, the waste heat is recovered to supply heat/hot water to nearby buildings increasing efficiency to 70-90%.

Particularly in summer, surplus heat can be used by means of absorption chillers to produce cold water which can be delivered to buildings via a separate cooling main. As well as displacing conventional electrically-driven air conditioning, this increases the overall heat demand, increasing CHP run-hours.

## Diversity of heat load

In order for CHP to be energy and cost effective there must be a simultaneous need for heat and power most of the time. For electricity, a scheme will usually supply local users such as the local authority and/or seek to establish a long-term contract with an energy supplier.

Diversity of heat load is the principal key to creating an overall consistent heat demand. City or town-centre community heating networks connect together a wide variety of different building types which require heating (and cooling) at different times of day and year. For housing, the daily heat requirement is greatest early in the morning and in the evening, while for offices and shops, the need is mostly during the day with cooling often as important as heating. Hotels and leisure facilities are examples of sectors with high year-round demand for hot water.

Once a network is established, any building can be connected, thereby demonstrating one of the clear benefits of community heating as separately many building types could not justify CHP and would have to use less efficient conventional heating systems.

## Helping to meet targets for HECA and Local Agenda 21

Community heating supplied by CHP and/or renewable energy usually produces substantially lower levels of CO<sub>2</sub> emissions than conventional heating systems, therefore helping local authorities to meet their environmental objectives under:

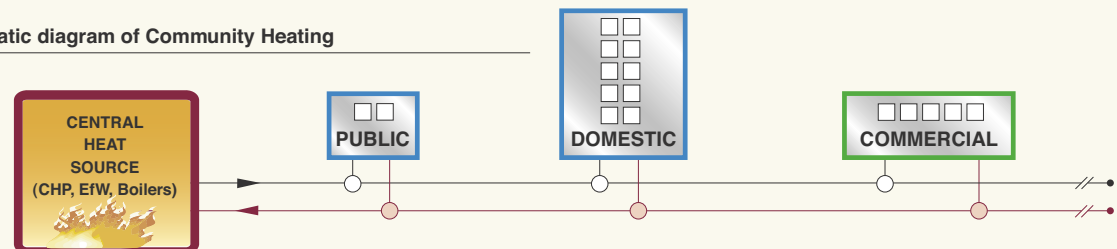
- Local Agenda 21, which commits local authorities to work to improve the environment
- Home Energy Conservation Act (HECA), which commits local authorities to assist households in their area to reduce energy use and meet targets for reducing CO<sub>2</sub> emissions.

## Tackling fuel poverty

Fuel poverty is the term used for households that cannot afford to keep adequately warm at reasonable cost. The government is committed to reducing fuel poverty and most local authorities have targets to reduce it.

Space heating and domestic hot water produced by community heating with CHP is considerably cheaper than that produced by conventional heating systems.

Schematic diagram of Community Heating



# Southampton District Energy Scheme: key factors in its implementation



## The geothermal catalyst

The Southampton District Energy Scheme was established in 1986. The catalyst for the scheme was a geothermal energy source beneath Southampton which was investigated by Southampton City Council, initially with government collaboration and EU support. Although the original project was abandoned, SCC still wanted to utilise the resource and found Utilicom to partner them in its development.

Geothermal heating utilises water heated by the Earth's interior. Hot salty water is pumped up from wells bored into aquifers. This water is then passed through heat exchangers that transfer the heat to clean water. While CHP now supplies most of the heating requirement, in Southampton the geothermal source still provides about 15% of the heat for SDES.

## Council recognition

SCC was keen to use its geothermal resource because it would provide heating for some council buildings while reducing greenhouse gas emissions. After meeting Utilicom, the Council became aware of the benefits of expanding the scheme and utilising CHP. In particular:

- Its potential contribution to the sustainable development of the city as a result of reduced CO<sub>2</sub> emissions
- Its economic and regeneration benefits as lower heating costs would attract businesses
- The social benefits of the scheme as a means of tackling fuel poverty and increasing well-being.

## Support and commitment

### High level support

From the beginning SDES has received strong cross-party support from councillors. The scheme was also championed by Mike Smith, an Executive Director of SCC, who estimates that he initially committed about 15% of his time to ensuring that the scheme went ahead. He continues to spend significant amounts of time developing and promoting the scheme and believes that the benefits of the scheme far outweigh the time it has taken to implement and to develop.

### Multi-departmental involvement

Representatives from departments including finance, planning, highways, housing, legal, property, regeneration and environmental policy were all included in the working party set up to implement and develop the scheme. Top level corporate support resolved any potential difficulties arising from differing departmental interests.

### The public private partnership – Southampton City Council and Utilicom

SDES is based on a successful public-private partnership; both SCC and Utilicom believe that their working relationship has greatly contributed to the success of the project. They cite the following features as having been of particular benefit:

**Finance provided by Utilicom** – Utilicom provided all the funding for the scheme (they own SGHC Ltd, the company set up to finance and run the scheme). SCC were therefore not exposed to any financial risk; this helped to gain high level support.

**Commitment** – Both SCC and Utilicom believed that for such a scheme to be successful both the public and private sector partners should make a long-term commitment.

**Co-operation** – Each party has always assisted the other. The co-operative nature of the relationship was captured in the Joint Co-operation Agreement (see page 6) drawn up by SCC. Mike Smith believes that the scheme development could easily have been hampered by the large number of Council departments involved. In practice, however, the Joint Co-operation Agreement has provided a strong focus for the Council and it has always helped Utilicom, for example by giving it equivalent status to that of Statutory Utility within the city boundaries.

**Pooling of expertise** – Both parties brought to the partnership complementary areas of expertise to plan, develop and market the Southampton District Energy Scheme: Utilicom the technical and managerial skills in community heating, SCC their vision and experience of managing a major city.

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Southampton City Council believes that the scheme successfully meets our objectives to provide:

- Affordable heat
- Security of supply
- Sustainability of supply
- A way of meeting the Council's HECA target, Agenda 21 and Nottingham Declaration objectives

We have set up an infrastructure that will allow the integration of new renewable sources of energy in the future.

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### Mike D. Smith

Executive Director  
Southampton City Council



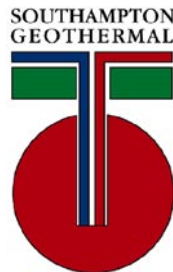
# Southampton City Council's philosophy and their relationship with Utilicom

## Southampton City Council's strategy for sustainable development

Southampton City Council is committed to the sustainable development of the city. It views community heating linked to CHP or other environmentally friendly energy sources as the best way to provide heating and where relevant, cooling. It believes it greatly benefits the environment while providing low-cost, reliable heating and cooling.

A key element of SCC's vision for the future of Southampton is the provision of a community heating infrastructure that serves all areas of the City utilising the most environmentally friendly energy sources. Its strategy for achieving this is to install community heating wherever possible. This includes large-scale schemes and smaller, stand-alone schemes. Its aim is to link the smaller "islands" to the main schemes in the future so that eventually all the city is served by a community heating infrastructure.

Heating and cooling will initially be provided by CHP; however, community heating is fuel flexible so that other sources of waste heat and new renewable technologies may be added later.



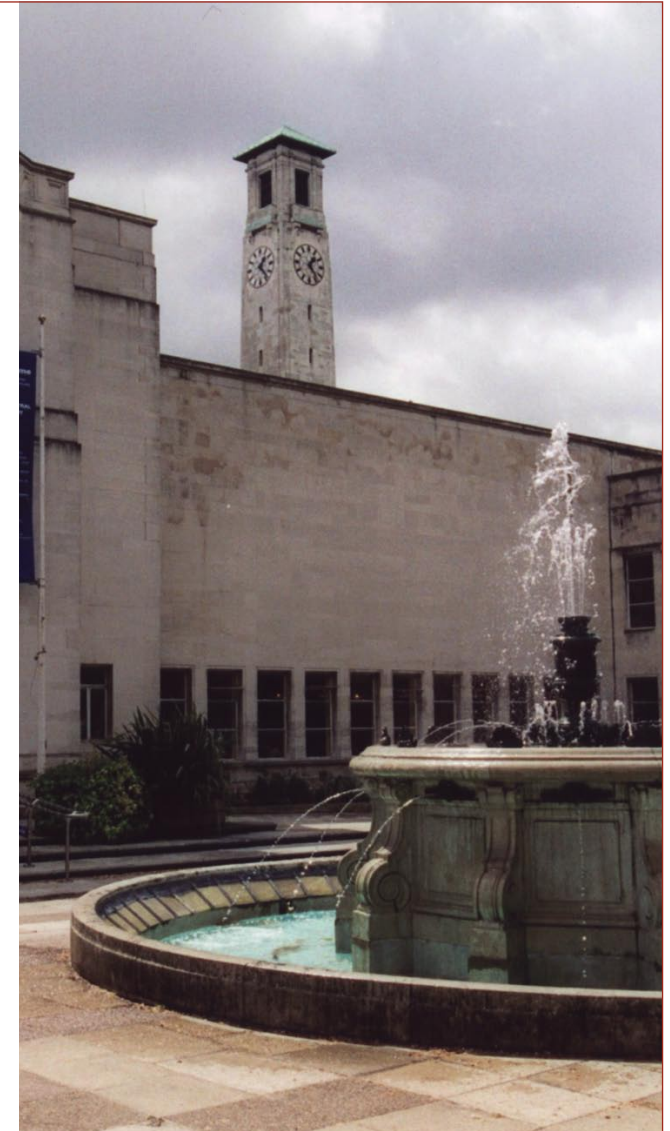
## The need for a private sector partner

Having made the decision to develop a community heating scheme in the city centre, the Council had to find a partner to fund, install and run the scheme, as it did not have the resources to do this itself. It selected Utilicom, a French-owned energy management company. Utilicom was chosen because, through its parent company in Europe, IDEX, it had extensive experience of the design, construction and operation of large community heating schemes, some of which utilised geothermal heat.

## The Joint Co-operation Agreement

The Council and Utilicom were both determined that the scheme should be a success. They believed their aim would be best achieved through a supportive and co-operative working relationship in which each party gave the other maximum assistance in developing the scheme.

This relationship was formalised in a Joint Co-operation Agreement drawn up by Jacqui Dixon, a former senior Southampton City Council lawyer, under which Utilicom and the Council each had specific obligations. It was as part of the Joint Co-operation Agreement that Southampton Geothermal Heating Company (SGHC) Ltd was set up by Utilicom to develop and run the scheme.



Under the Joint Co-operation Agreement, Utilicom committed to:

- Develop the community heating scheme in Southampton initially utilising the city's geothermal resource, and then adding CHP
- Sell heat to Council buildings with agreed savings
- Provide all necessary funding, technical and management expertise to ensure that the scheme develops successfully.
- Provide open book accounting and a long-term profit share to SCC.

SCC committed to facilitate the success of the scheme by:

- Taking heat wherever practical for SCC buildings
- Helping Utilicom promote the scheme to other potential users
- Providing general support to Utilicom in developing the scheme – particularly through the planning and highways departments (see next page)
- Providing the land for the Heat Station at a peppercorn rent and giving ownership of the geothermal resource to Utilicom.
- Treating Utilicom as a 'statutory utility' within the boundaries of the City.

Both SCC and Utilicom cite their co-operative working relationship as a key factor in the success of SDES.

### Who's who in the Southampton District Energy Scheme

Southampton Geothermal Heating Company is the energy services company that finances, develops, manages and operates the Southampton District Energy Scheme. SGHC is owned by Utilicom and works in partnership with Southampton City Council under a Joint Co-operation Agreement signed in 1986 when the scheme began.

Utilicom Group is the energy management company that set up and owns SGHC. Utilicom and its parent company, IDEX, also operate other schemes in the UK and mainland Europe.



Mike D Smith, Executive Director of Southampton City Council and Simon Woodward, Chief Executive of Utilicom

### Who's connected?

#### Heat

Southampton City Council  
Southampton Primary Care Trust  
Southampton University  
Hospitals Trust  
Southampton Institute  
ASDA  
Barratt Homes Southampton  
Unite Housing  
John Lewis Partnership  
Marks and Spencer  
Hammerson Plc  
Furniture Village  
Accor Hotels (Novotel and IBIS)  
De Vere Hotels  
Forestdale Hotels  
Skandia Life  
BBC  
Paris Smith and Randall  
The Mosque  
Square Balloon

#### Chilled Water

Southampton City Council  
De Vere Hotels  
John Lewis  
Marks and Spencer  
Hammerson  
BBC

#### Individual retail units

Arcadia  
Athena  
Body Shop  
Clinton Cards  
Discovery Store  
Electronics Boutique  
Ernest Jones  
F Hinds  
Gap  
Gadget Store  
H Samuel  
Habitat  
The Vestry (formerly Moss Bros)  
Oasis  
Photo Optix  
Pilot Clothing  
Southampton FC  
Crabtree & Evelyn  
Essential Dragons

# How the Council helps to win customers



## Winning Customers

Utilicom and Southampton City Council have worked together to ensure that SDES is marketed successfully to potential customers. In the first instance, the Council's planning department identifies potential new customers for the scheme and notifies Utilicom.

Utilicom then contacts the potential customer to explain the scheme and its advantages. After obtaining information about current energy consumption and operational costs, Utilicom works out prices for connection to SDES and subsequent heating and/or cooling supply costs. These prices are generally significantly cheaper than those for installing and running the conventional systems. Consequently at this stage, Utilicom may persuade the potential customer to connect to the scheme.

The lower and middle management to whom Utilicom generally speaks are often nervous of new technology, preferring to implement what they are familiar with, and they may not realise the financial and environmental benefits that connection to community heating can bring. On these occasions, the Executive Director of Southampton City Council will approach the potential customer at director or board level. He will explain the Council's objectives, the cost saving to users and social and environmental benefits of the scheme, and tell the potential customer about the scheme's current customers. The Council has found that in commercial companies, top management are usually quick to recognise the financial and environmental benefits of connection to SDES. However, as a local government officer, he has to be careful to stress to each prospective customer only the benefits to the City and the community; the financial arrangements are strictly dealt with by Utilicom.



### Using council powers to convince customers

SCC has recently strengthened its ability to put the case for potential customers to connect to SDES through the Structure Plan and the City Development Plan. In the environmental section of these plans, the Council has stressed the need for sustainable development utilising CHP or renewable energy and requires developers to explore the use of these technologies rather than automatically installing conventional heating systems.

Planning policy has to be validated against the Structure Plan and the City Development Plan. The Planning Department can now insist that developers explore the use of CHP or renewable energy as alternatives to conventional heating systems.

Where land to be developed belongs to SCC the Council can insist that developers connect to SDES. This requirement is written into the land sale agreement and the building agreement.

### Use of Section 106 funding

Section 106 funding is money that developers have to pay to the Council for infrastructure works required as a result of new developments. SCC has sometimes used this mechanism to encourage developers to provide infrastructure for the development of SDES as 'works in kind'. For example, SCC agreed with the West Quay developers that they install distribution mains within the West Quay shopping centre to take chilled water to all individual shop units.



# Description of the Southampton District Energy Scheme

## Overview of SDES

SDES distributes hot water produced at the scheme's heat station to buildings in the city. The scheme was established in 1986 with only one customer. Today Southampton Geothermal Heating Company has heating, cooling and electricity sales of over £2 million and serves over 40 private and public sector customers and hundreds of domestic customers.

The scheme now has over 11km of insulated service pipes taking hot and chilled water to customers. Its annual energy sales are 70GWh per year and 23GWh of electricity produced from the CHP generating plant is sold to Powergen under a 10-year non-pooled generation contract signed in 1998.

## District cooling system

In addition to supplying heating, a cooling network was developed in 1994 which provides chilled water for air conditioning to hotels, retailers and a leisure centre.

## Development of the customer base

SDES has developed in three stages:

### Stage one

In 1986, the Civic Centre was the scheme's first customer. Other major city centre buildings followed including Asda in 1988, the BBC TV South studios in 1990, the De Vere Grand Harbour Hotel in 1994 and the Royal South Hampshire Hospital in 1995. The De Vere Grand Harbour Hotel was the first customer to be connected to the scheme's chilled water ring main.

### Stage two

In 1998 with the substantial connected heat load, it became possible to add significant CHP plant and Utilicom raised £3.2m of external bank finance to fund a high-efficiency dual-fuel 5.7MWe Wärtsila CHP engine.

### Stage three

In the late 1990s, the West Quay area of Southampton was redeveloped. New customers in this area are: The Quays, a swimming & diving complex, and the West Quay shopping centre which includes the John Lewis and Marks and Spencer anchor stores.

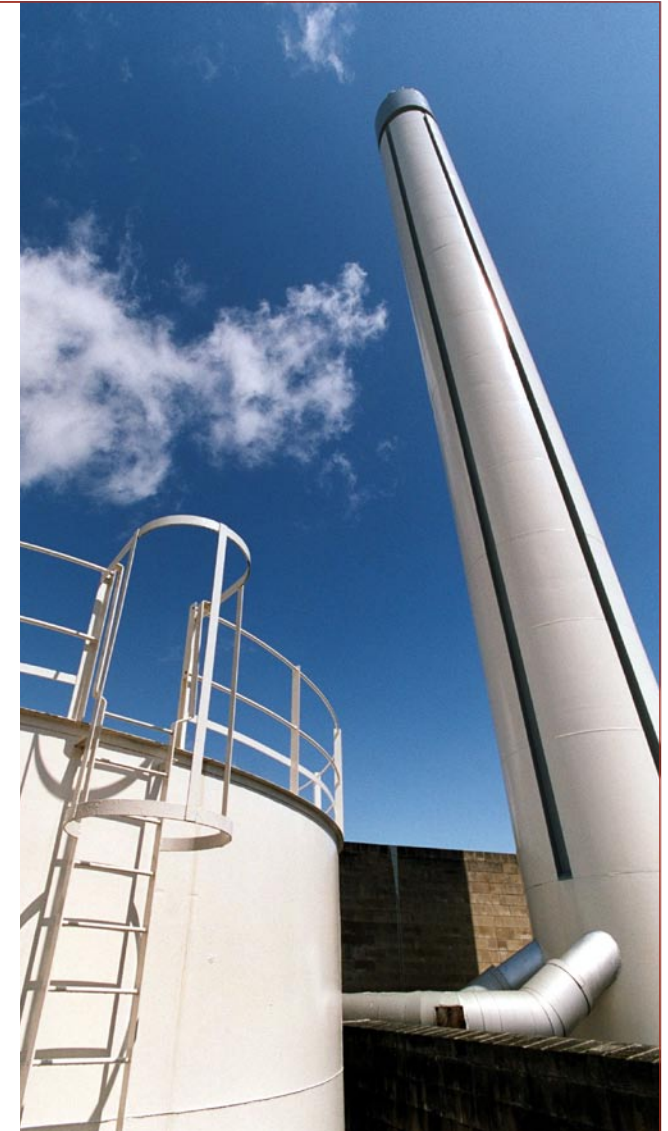
In 2000, Barratt Homes connected their Park View apartments (see GPCS 400), 108 private dwellings, to the scheme and in 2003 its Dell development of 164 dwellings was also connected.

## Energy sources for SDES

SDES utilises energy from CHP plant, geothermal energy and conventional gas-fired boilers. The cooling network utilises both absorption chillers that use surplus CHP heat, and conventional vapour compression machines.

### CHP

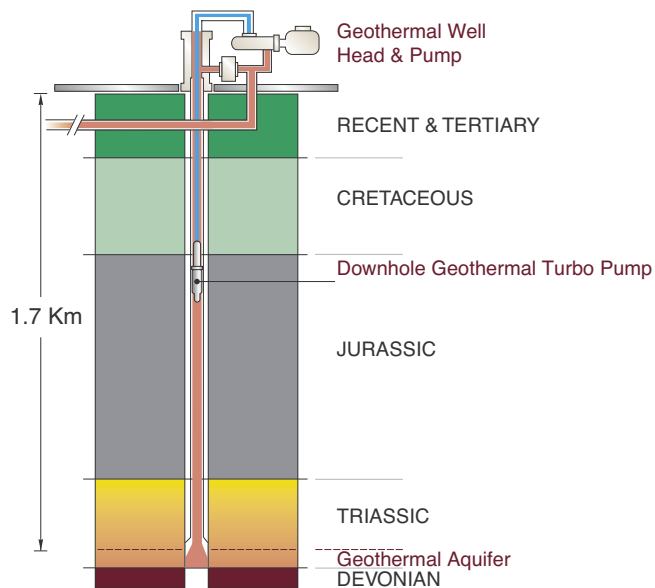
SDES has three CHP units together providing over 70% of the annual heat requirement for the scheme. The 5.7MWe high-efficiency dual-fuel unit, capable of running on gas or oil, enables Utilicom to use whichever is cheaper. There are also two smaller (400kWe) gas-fired reciprocating engines.



### Geothermal heat source

Southampton has a geothermal heat source under the city centre. Hot water at 74°C is pumped up from a depth of 1.7km beneath the city centre and utilising heat exchangers, it is used to heat water for the scheme. At present, 15% of the energy used by the scheme is provided by the geothermal heat source.

#### Geology of the Geothermal Well



### Conventional heating boilers

Conventional boilers are the least energy efficient of the heat sources utilised by the network but they provide essential top-up heating for the network to meet seasonal periods of high demand. There are eight conventional boilers: two situated at the Heat Station, four at the Civic Centre and two at the Royal South Hampshire hospital.

### Absorption chillers

Absorption chillers utilise heat from the CHP generators to produce chilled water for the district cooling system.

Southampton's 5.7MW<sub>e</sub> CHP Engine (below)



# Operation of the scheme

The services offered to SGHC customers are hot water for providing both space heating and domestic hot water, and chilled water for cooling.

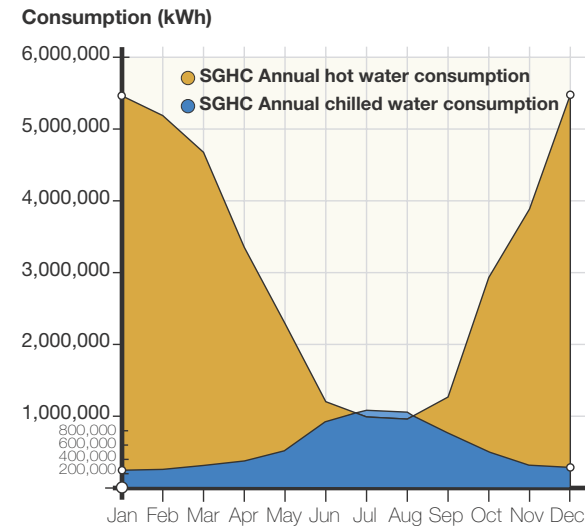
The electricity generated by the scheme is used to power the pumping system with the remainder being fed into the National Grid and sold to Powergen under a long-term contract.

## Hot water

SDES works like a huge domestic central heating system. Water is heated at the scheme's heat station and circulated through an underground pipe network to customers in the city centre. The pipes are very well insulated, with heat losses of only 1°C per km. The water is distributed at a seasonally variable temperature of 70-82°C with a design return temperature of 50°C. This low return temperature is very important to maximise heat recovery from the CHP and geothermal well. The pipe network eventually returns to the energy centre where the water is re-heated.

Customers are connected to the network via a pair of pipes with isolating valves, differential pressure regulation and a heat meter. These replace a conventional boiler. Radiators are fed directly from the pipe network and domestic hot water is produced via heat exchangers connected to the pipes. Boilers and hot water storage tanks are not required, so a considerable amount of space is made free for other purposes.

**SGHC Annual chilled water/hot water consumption profile**



## Chilled water

Some of the heat from the CHP generator is utilised in an absorption chiller to produce cold water. The water is then circulated through insulated mains to provide cooling to businesses in the city centre, including West Quays shopping centre, The Quays leisure complex, the De Vere Grand Harbour Hotel and the BBC Studios. The chilled water is then used directly in air handling units.

An ice storage system will soon be added to this scheme to meet peak load demands. The ice store will be frozen at night using chillers driven by electricity from the CHP generators. The ice will be used to provide cooling during the day.

## Security of supply

A number of features have been built into the Southampton scheme to ensure a high level of security of supply for customers:

- 1 Built-in standby capacity – there is substantial built-in standby capacity that can be utilised should there be a problem with any of the main heat supplies.
- 2 Dual-fuel CHP generators – the large CHP unit and the boilers can run on either gas or oil, which provides security of supply should there be a utility failure or if either of these utility prices becomes uncompetitive.
- 3 Operation and maintenance engineers – Utilicom provides a team of operation and maintenance engineers dedicated to the scheme and based in the City. They meet clients' needs with an automatic call-out facility with a 24/7 response.
- 4 The pipe network – pipes are robustly constructed and have a built-in leak detection alarm. They are guaranteed for 15 years and the life expectancy of these pipes can extend to 50 years.
- 5 Statutory Utility Status–SCC have effectively granted SGHC Statutory Utility Status within the boundaries of the city which means that it receives notice of all building works that may affect buried pipes.

### Contract Periods and Pricing

All heat and chilled water supply agreements with the various consumers are for 20 years. These agreements are essential in enabling Utilicom to obtain long-term financing, needed for developing the network and integrating sustainable energy plant into the scheme. This also benefits the customers in the form of highly competitive tariffs for heating and cooling.

Each agreement contains a basket of indices which ensures that cost savings at the start of the contract are maintained throughout the period of supply.

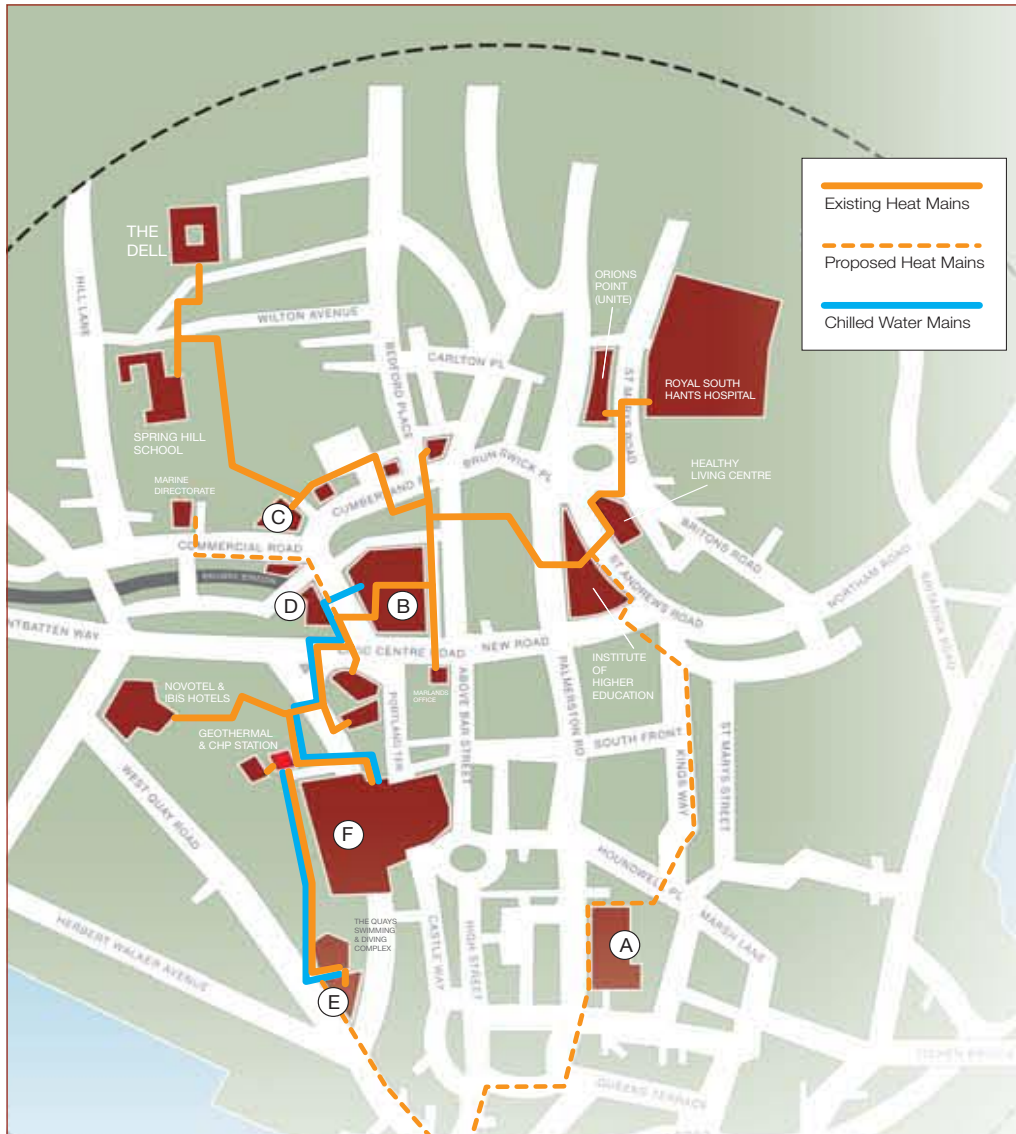
### Metering and billing

There are three types of billing system:

- 1 For most of the customers energy consumption is automatically calculated and bills are sent to the users by Utilicom.
- 2 All the privately owned Park View and Dell apartments are individually metered. Utilicom sends the managing agent a single bill with a breakdown of units for each flat. The managing agent apportions the bill according to consumption and collects payments. They then make a single payment to Utilicom.
- 3 For the Holyrood Estate which is a separate community heating scheme supplied by its own 110kWe CHP plant, heat is metered centrally and all tenants pay a common charge, based on the size of their dwellings, via their rent.



# Customer case studies



# Customer case studies

## About the Civic Centre

The Civic Centre was the first building to connect to the scheme. It houses the main City Council offices. The building has a heat load of over 2MW.

The benefits are:

- The Council provides an example for others to follow
- The cost of heat is guaranteed to be less than alternative fuels
- The Council feel connecting to SDES gives them greater flexibility – if their needs change Utilicom meet their requirements
- Community heating with CHP is recognised by the City Council as one of the most environmentally friendly options
- Maintenance is handled by Utilicom and the costs are lower.

Additionally, Council staff believe that there have been fewer supply interruptions than with conventional heating.

Currently the building's management are considering taking chilling from SDES' district cooling network.



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## Park View

Barratt Southampton (part of Barratt Homes – the national house-builders) has connected Park View, a new development of luxury apartments, to the Southampton District Energy Scheme.

Using community heating in their new development rather than a gas mains supply and individual boilers, had a number of advantages for Barratt Homes:

- Significant capital cost savings were made
- Gas was not brought into the development removing associated installation issues
- The absence of a boiler and storage tank created extra space that was used to enhance the design and give additional storage space.

Residents benefit from lower running costs and less maintenance than for conventional systems. Also, community heating provides instantly available hot water and high water pressure for showers.

According to a postal survey, residents are very pleased with the heating and hot water system. Of those surveyed, 69% thought that the community heating system was better than their old system (in most cases this had been gas central heating and hot water) 31% had not noticed any difference.



C

## BBC South

BBC South's building has been taking heat from SDES for more than ten years. They have been provided with a reliable service and subsequently decided in 2000 to also take cooling from the scheme.

The building's chiller plant had reached the end of its useful life and the BBC investigated the options of replacing the chillers or connecting to the SDES cooling network. They were particularly concerned about reliability, continuity of supply and maintenance costs through the life of the building. These concerns were addressed by Utilicom during the negotiation process.

The costs of connecting to the district cooling network were similar to the costs of replacing the chillers, but district cooling had several advantages:

- The responsibility for providing cooling to the site was outsourced to Utilicom
- Running costs were lower because maintenance and plant replacement were included in the cost of cooling provision
- Connection to the district cooling network was more environmentally friendly than using on-site chillers.

To ensure they have continuity of supply the BBC confirmed with Utilicom that they would install temporary chillers should there be a prolonged failure of the district scheme. This is intended as a precautionary measure and it is not envisaged that this facility will be required.



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# Customer case studies

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## De Vere Grand Harbour Hotel

The De Vere Grand Harbour Hotel is Southampton's leading luxury 5-star hotel. The developers were concerned regarding the potential reliability of supplies from the scheme when considering a connection in the early 1990s and they then suffered a capital cost issue in respect of the whole development.

Utilicom offered to connect the hotel to the scheme at zero capital cost, recovering connection costs through the long-term energy charges. This helped the development to proceed and in 1994, Utilicom laid heating and cooling mains 600 metres across the city to connect the hotel to the scheme.

The hotel became the first chilled water consumer on the network. The subsequent reliability in the supplies of heat and chilled water to the hotel and the prestigious nature of this development has been one of the main sales tools for Utilicom when connecting other prospective private consumers onto the scheme.



## West Quay

The West Quay Shopping Centre is a major city centre development in Southampton. Comprising of a 53 acre shopping complex, West Quay opened in 2000 and includes many major retailers. The City Council planning department encouraged connection to SDES; Hammerson Plc, the owners of the Centre were convinced and were impressed by the prospect of environmentally friendly heating and cooling.

Consequently, the Centre takes both heating and cooling from the scheme as do the anchor stores Marks and Spencer and John Lewis. Other retailers have access to cooling from the scheme.

F

The main benefits from connection to the scheme are:

- The cost of boiler and chiller plant is substantially reduced, saving capital expenditure. This plant was not required and instead Utilicom levied a connection charge.
- The responsibility for providing heating and cooling is removed from the Centre's management – their role is to monitor the performance of Utilicom.
- There is a considerable space saving in the Centre.

The only aspect of concern was that there is no on-site back-up. Hammerson however, satisfied themselves that SGHC has reliable back-up systems and sufficient capacity to cope with a major failure from their off-site supplier.





# Customer Benefits



## Financial benefits

The cost of heating and hot water supplied by SDES is significantly less than heating and hot water supplied by conventional systems using individual boilers connected to the mains gas supply. This is partly because SGHC has revenue from sales of electricity produced by the CHP generators. Customers make savings in a number of ways:

### Cost of equipment and mains connection

The cost of connection to SDES is usually between 15% and 25% less than the cost of a conventional system (including connection to the gas mains and the installation of individual boilers). The saving depends on the proximity to the heat mains of the building to be connected.

### Heat supply costs

Heat and cooling supply costs which are made up of fuel and maintenance are 10% to 15% lower than for a conventional system. The need for annual boiler maintenance is also avoided.

### Other capital savings

Long-term capital expenditure on boiler replacement is avoided. There is a small capital cost associated with replacement of the heat exchangers utilised for the supply of domestic hot water. These have an expected life of 10 years but they are considerably cheaper to replace than boilers, and are commonly used with boiler based heating systems to generate domestic hot water.

## Benefits for SDES customers

	Commercial and public sector customers	Domestic customers
Cheaper heating and hot water	✓	✓
Affordable warmth		✓
Continuous high pressure supply of hot water	✓	✓
Cheaper cooling	✓	
Environmentally friendly image	✓	✓
Security of supply	✓	✓
Space saving	✓	✓
Aesthetic improvements (Internals: less plant, no flues)	✓	✓

# Lessons to be learned from the scheme and future plans

The Southampton District Energy Scheme is a very successful example of a city centre scheme. Some of the key factors contributing to this success are:

## High level of commitment

Establishment of the scheme was strongly supported by Councillors and championed by SCC Executive Director Mike Smith, whose financial background also helped him to make the case and gain support for the scheme.

The Councillors were impressed with the benefits of the scheme and their support overcame any potential objections.

## Involvement of Council departments affected by the scheme

A multi-departmental working party was set up to implement and develop the scheme. It involved all Council departments with an interest in the scheme.

This brought important experience and knowledge to the project and this approach also prevented potential delays that could have been caused by individual departments.



## No financial commitment from SCC

SCC was not responsible for financing the scheme. This removed risk and therefore helped win support. SCC did, however, provide land for Utilicom to build a heat station and the geothermal well-head in return for a long-term profit share.

## Right choice of private partner

SCC chose a partner:

- With a track record of developing and running community heating schemes
- Who gave a long-term commitment to the scheme
- Who could finance the scheme
- With whom SCC could develop a good, co-operative working relationship

## Co-operative relationship between partners

SCC and Utilicom have an excellent working relationship. They pool their expertise and work together to ensure the scheme is a success. There is cross-departmental involvement and council departments work to support the development of the scheme.

### **Marketing is vital**

Utilicom and SCC work closely together to market the scheme to potential customers. They use cost saving and environmental arguments and will approach customers at various management levels. SCC uses the statutory development plans to encourage customers to connect.

The development control department also promotes the scheme to potential developers.

### **You can start small and grow**

SDES commenced in 1986 with one customer. The scheme has gradually been extended and now has over 40 commercial and public sector customers and hundreds of domestic customers.

### **A variety of customers**

Part of the success of SDES has been in attracting a variety of customers with different heating (and cooling) requirements. Of particular benefit are buildings such as hospitals and hotels which have year-round 24 hour heating or cooling. The scheme's customers also include housing, retailers, offices and a leisure centre.

### **Recent Additions and Future Plans**

Two developments connecting to the SDES have received grant support from the Government's Community Energy programme:

Southampton City Council secured a grant of £101k for the extension of the heat network to 160 newly built homes and a school, reducing carbon emissions by some 273 tonnes per year and saving about £7.5k.

The Royal South Hampshire Hospital was awarded a grant of just over £93k for the connection of 7 hospital buildings to the SDES network. Utilicom is using this grant to install CHP plant at the hospital and connecting this to the existing community heating network within the hospital. Surplus heat will be exported to SDES. Carbon savings will accrue to about 175 tonnes per annum and the hospital will save £18k annually.

### **Integration of renewable energy sources**

SCC and Utilicom are planning to add a biomass boiler fed from wood chip. An anaerobic digestion plant is also planned in the medium term. This will produce bio-gas from household waste that can be burned by CHP plant.

### **Integration of ice storage**

There are plans to integrate an ice storage system to meet peak load demands. The ice store will be frozen at night using chillers driven by electricity from the CHP generators.

### **The expansion of the scheme**

SDES is expanding and in the next two to five years, another 500 dwellings and a large retail/leisure complex will be connected.

In 1997, the Council installed a stand-alone community heating scheme to serve 300 council-owned flats at the Holyrood estate. These were originally too far away from the SDES mains to make connection to the main scheme economical; however, as the SDES network expands future connection may be practical.

### **Millbrook Community Heating Scheme (MCH)**

MCH is another SCC/Utilicom partnership planned for the northwest of Southampton. It will initially include 3,400 council homes, 1,000 private dwellings and 14 other council buildings. Space heating and domestic hot water for this development will be provided by a community heating network connected to a new 50MW CHP generator.

This scheme will reduce carbon emissions by a further 80,000 tonnes per annum, meeting 1/3 of the Council's target for reducing carbon emissions. It will also address fuel poverty with an average price for heating and hot water per dwelling of approximately £5 per week.

£5 million was awarded to SCC by the South East Economic Development Agency under the Single Regeneration (Round 5) Budget), to convert dwellings for connection to this scheme.

SCC will bill Council properties connected to the Millbrook scheme and private customers will be billed individually by Utilicom.

# Useful contacts

## IEA District Heating and Cooling programme

The IEA DHC programme ([www.iea-dhc.org](http://www.iea-dhc.org)) is an international co-operation between 10 countries co-ordinating R&D projects on all aspects of District Heating and Cooling.

## CHP club

The CHP Club ([www.chpclub.com](http://www.chpclub.com)) is a Carbon Trust initiative, aimed at assisting users and potential users in getting the maximum benefit from CHP.

Mike D. Smith, Executive Director, Southampton City Council, is the CHP Club's Local Government CHP Champion (appointed by the Minister for the Environment).

## Combined Heat and Power Association

Grosvenor Gardens House,  
35 – 37 Grosvenor Gardens  
London SW1W 0BS  
Tel 0207 828 4077  
Fax 0207 828 0310  
Web [www.chpa.co.uk](http://www.chpa.co.uk)

## Euroheat and Power

The International Association for District Heating, District Cooling and CHP.  
Web [www.euroheat.org](http://www.euroheat.org)

## Further reading

### The Carbon Trust

The following publications are available from the Carbon Trust from [www.thecarbontrust.co.uk/energy](http://www.thecarbontrust.co.uk/energy) or the Helpline, 0800 58 57 94

- GPG234 Guide to community heating and CHP
- GPG322 CHP Opportunities for Local Authorities
- GPCS80 Rejuvenation of community heating
- GPCS434 An integrated approach to energy services at Woking Borough Council

### Energy Efficiency Best Practice in Housing

The following publications are available from [www.est.org.uk/bestpractice](http://www.est.org.uk/bestpractice) or the Helpline, 0845 120 7799

- NPP123 Energy services PPP/PFI projects for community heating
- GPG240 Community heating – a guide for housing professionals
- NPP112 Opportunities for electricity sales to tenants from residential CHP schemes
- NPR113 Selling CHP electricity to tenants – opportunities for social housing landlords
- GPCS312 Community heating in Nottingham
- GPCS370 The use of CHP in community heating schemes
- GPCS400 Community heating serves luxury private apartments

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